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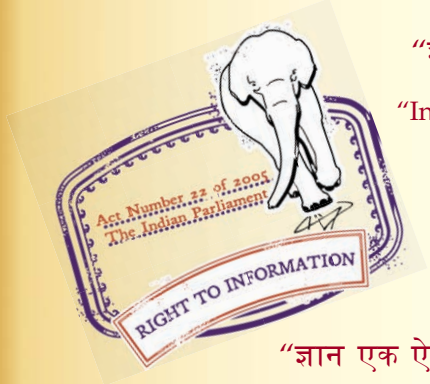

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"Knowledge is such a treasure which cannot be stolen"

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Indian Standard

SYMBOLS AND ABBREVIATIONS FOR USE IN GEOLOGICAL MAPS, SECTIONS AND SUBSURFACE EXPLORATORY LOGS

PART III SEDIMENTARY ROCKS

(Second Reprint JULY 1998)

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Indian Standard

SYMBOLS AND ABBREVIATIONS FOR USE IN GEOLOGICAL MAPS, SECTIONS AND SUBSURFACE EXPLORATORY LOGS

PART III SEDIMENTARY ROCKS

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Indian Standard

SYMBOLS AND ABBREVIATIONS FOR USE IN GEOLOGICAL MAPS, SECTIONS AND SUBSURFACE EXPLORATORY LOGS

PART III SEDIMENTARY ROCKS

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 2 April 1974, after the draft finalized by the Subsurface Exploration Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 In all spheres of engineering construction, data on the nature of the geological formations constituting the foundations are indispensable. Often, these data are given on maps or in geological sections using symbols and abbreviations. Geological maps and sections are also required for other activities, such as mining and mineral prospecting. Such maps and sections are therefore being prepared by various agencies in the country. In the absence of any standard for the guidance of the engineering geologist or engineer, different symbols and abbreviations are being used by different agencies, resulting in entirely different representations of the same geological data. The data collected and presented by one agency for a particular purpose is often useful to other agencies investigating for a different job. It, therefore, becomes essential for all agencies to follow the same practice. This standard has been prepared to fulfil this need.

0.2.1 This standard (Part III) deals with sedimentary rocks while other parts are as follows:

Part I Abbreviations

Part II Igneous rocks

Part IV Metamorphic rocks

Part V Line symbols for formation contacts and structural features

0.3 The symbolization of rock types is based on the principles laid down by the International Organization for Standardization. For the rock types to be covered for symbolization, classification of sedimentary rocks as adopted by United States Bureau of Reclamation for engineering purposes has been used.

0.4 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard (Part III) covers symbols for sedimentary rocks for use in geological maps, sections and logs of bore holes, test pits, exploratory drifts and shafts for river valley projects. Rock types covered in this standard are restricted to those commonly met with in engineering practice.

2. BASIC PRINCIPLES OF SYMBOLIZATION

2.1 In order to represent a type of rock on a map or on a plan, the corresponding surface should be covered by the symbols representing the rock in question. The surfaces occupied by rocks of different types should be separated by a continuous thin line if there is a clear demarcation among the different types in nature.

2.2 The graphic symbols should be used in black and white for the representation of rocks and minerals. Additional letter symbols may be used to designate other characteristics, such as age.

2.3 There is a great variety of rocks and it is impossible to have an individual symbol for each of the rock types that are found in nature. For this reason, the symbols are developed for the most important and frequently occurring rock types. For listing the rock types, one of the simpler systems used for classification of rocks has been followed; however, the tables of symbols for rock types are not meant to provide a standard system of classification. The symbolization is based on the following principles:

a) In order to characterize the properties of rocks, elementary symbols are chosen, which should:
   1) be as simple as possible and therefore easily traceable,
   2) express the nature of the rock, and
   3) be of such dimensions that several elementary symbols can be placed next to each other.

*Rules for rounding off numerical values (*revised*).

b) Principal rock types are represented by the juxtaposition of several identical elementary symbols; the variations of the above are shown by the addition of the elementary symbols which characterize the principal constituents.

c) In order to characterize the loose form of rock, symbols should be arranged with no determined order; a systematic staggered arrangement should represent the consolidated form of a rock.

d) The individual elements or the rows of symbols should be arranged either parallel to the stratification or foliation where applicable or parallel to the margin of the map or the geological formation under portrayal, as found convenient. The procedure adopted should be indicated on the plan.

2.3.1 The basic symbols given in this standard should not be used for representations other than specified. Within the framework of these principles, symbols for other rocks not covered in this standard may be developed and intimated to the Indian Standards Institution. Similarly for any characteristic not represented by a symbol, a new symbol may be chosen.

3. GRAPHIC SYMBOLS FOR SEDIMENTARY ROCKS

3.1 Elementary and Basic Symbols — The elementary symbols relating to sedimentary rocks and the basic symbols for the principal rock types are given in Tables 1 and 2 respectively.

3.2 Mixed Symbols for Rocks

3.2.1 For developing mixed symbols for sedimentary rocks of a mixed character, the following points should be kept in view:

a) Irregular arrangement of the basic symbols characterizes loose rocks and a systematic staggered arrangement represents consolidated rocks.

b) The symbols for mixed types of rocks are derived by combining suitably elementary symbols (*see* Table 1) and the basic symbols (*see* Table 2).

3.2.2 The symbols for different rock types commonly met with in engineering practice are given in Table 3. Symbols for rock types not given in this table may be developed on the basis of the principles laid down in **2.3** and **3.2.1**.

3.2.3 Where features are too small for graphical representation either an asterisk may be given against the feature and explained in the legend or the name of the rock written out.

TABLE 1 ELEMENTARY SYMBOLS RELATING TO SEDIMENTARY ROCKS

[*Clauses* 3.1 *and* 3.2.1 (b)]

Detritus		Anhydrite	
Gritty pebbly		Sodium salt	
Sandy		Potassium-magnesium salt	
Silty			
Argillaceous		Ferruginous	
Calcareous		Siliceous	
Dolomitic		Carbonaceous	
Gypsiferous		Bituminous	

(Continued)

TABLE 1 ELEMENTARY SYMBOLS RELATING TO SEDIMENTARY ROCKS — *Contd*

Miscellaneous

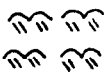
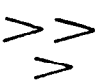
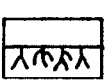
Concretion		Humous	
Ooides		Fossiliferous (in general)	
Incrustations for example ferruginous		Vertebrates	
		Invertebrates (marine)	
Cavern for example in limestone		Invertebrates (non-marine)	
		Microfauna	
Volcanogenetic admixtures		Flora	
		Microflora	
Stigmarion bed		Shelly layer	

TABLE 2 BASIC SYMBOLS FOR PRINCIPAL TYPES OF SEDIMENTARY ROCKS

[*Clauses* 3.1 *and* 3.2.1 (b)]

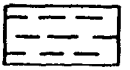
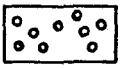
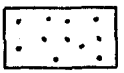
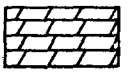
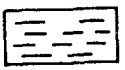
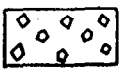
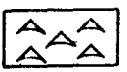
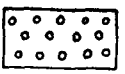
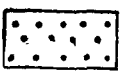
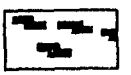
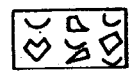
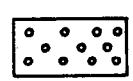
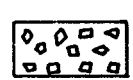
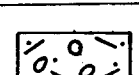
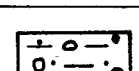
Detritus		Mudstone	
Gravel		Shale	
Sand		Limestone	
Silt		Dolomite	
Clay		Gypsum	
Breccia		Anhydrite	
Conglomerate		Sodium salt	
Sandstone		Siliceous rocks	
Siltstone		Peat	

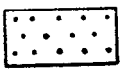
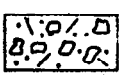
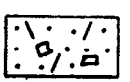
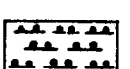
TABLE 3 DERIVED SYMBOLS FOR SEDIMENTARY ROCK TYPES

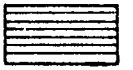
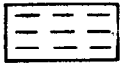
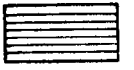
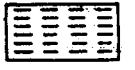
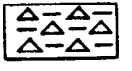
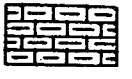
(*Clause* 3.2.2)

Texture	Essential Constituent	Definitive Characteristic		Petrographic Type	Symbol
Clastic (composed predominantly of rock and mineral grains derived by weathering and erosion, and deposited by water, wind, ice or gravity; showing varying degrees of cementation or consolidation)	Volcanic ejecta	Fragments > 32 mm		Agglomerate or breccia	
		Particles > 4 mm < 32 mm		Lapilli tuff	
		Particles < 4 mm		Tuff	
	Gravel	Abraded particles > 4 mm over 50%, clay < 25%		Conglomerate	
	Rock and mineral fragments	Angular particles > 4 mm over 50%, clay < 25%		Breccia	
	Rock fragments and clay	Fragments are greatly varied, occasionally exhibit faceting, high range of sizes usually unsorted; matrix usually clay, sometimes sand, usually greatly in excess of fragments	Loose	Till	
			Compact	Tillite	

(*Continued*)

TABLE 3 DERIVED SYMBOLS FOR SEDIMENTARY ROCK TYPES — *Contd*

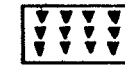
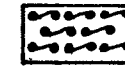
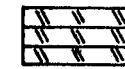
Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
Clastic (composed predominantly of rock and mineral grains derived by weathering and erosion, and deposited by water, wind, ice or gravity; showing varying degrees of cementation or consolidation)	Sand	Particles < 4 mm > 1/16 mm over 50%, clay < 25%	Sandstone	
			Quartzite	
			Arkose	
			Graywacke	
			Subgraywacke	
	Detrital grains of calcite	Calcite > 50%, clay < 25%	Limestone	
	Silt	Particles < 1/16 mm over 50%, clay < 25%; massive to stratified	Siltstone	

	Predominant particles < 1/16 mm, fissile	Shale	
	Predominant particles < 1/16 mm, open structure	Loess	
Clay minerals	Clay > 25%, massive to stratified	Claystone	
	Predominantly clay or silt, fissile	Shale	
	Predominantly clays and sericite, incipient recrystallization	Argillite (mudstone)	
	Montmorillonite clays > 75%	Bentonite	
	Kaolinite clays > 75%	Kaolin	
Clay and calcite	Very fine grained; carbonates 25 to 75%	Marl, marlstone	

(*Continued*)

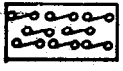
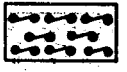
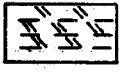
TABLE 3 DERIVED SYMBOLS FOR SEDIMENTARY ROCK TYPES — *Contd*

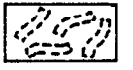
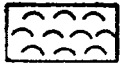
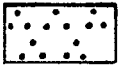
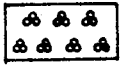
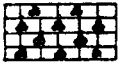
Texture	Essential Constituent	Definitive Characteristic		Petrographic Type	Symbol
Crystalline (composed predominantly of coarse to fine or microcrystalline to cryptocrystalline aggregates of crystals precipitated chemically or biochemically from surface or subsurface waters)	Calcite	Carbonate > 50% of which calcite > 50%	Coarse to microcrystalline, compact	Limestone	
			Fine to microcrystalline, porous, firm to friable	Chalk	
			Spongy, porous, firm to friable, fine to microcrystalline	Tufa	
			Compact to porous, banded, fine to microcrystalline	Travertine	
	Calcite and clay	Very fine-grained; calcite 25 to 75%		Marl, marlstone	
	Carbonates	Carbonates > 25%, compact to earthy; deposited by ground water		Caliche	
	Dolomite	Carbonate > 50% of which dolomite > 50%; coarse to fine, compact		Dolomite	
	Chalcedony	Chalcedony > 25%, microcrystalline to cryptocrystalline; conchoidal fracture, compact		Chalcedonic chert	

Cryptocrystalline quartz	Cryptocrystalline quartz, > 50%	Novaculite	
Chalcedony	Chalcedony > 25%; friable to firm; earthy to porous	Tripoli	
Crystalline phosphates	Crystalline phosphates > 50%	Phosphorite	
Anhydrite	Anhydrite > 50%	Rock anhydrite	
Gypsum	Gypsum > 50%	Rock gypsum	
Halite	Halite > 50%	Rock salt	
Haematite	Haematite > 50%	Haematite rock	
Crystalline hydrous aluminium oxide	Hydrous aluminium oxides > 50% of which > 50% are crystalline	Bauxite	

(*Continued*)

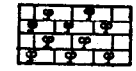
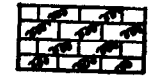
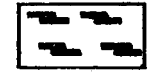
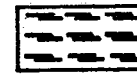
TABLE 3 DERIVED SYMBOLS FOR SEDIMENTARY ROCK TYPES — *Contd*

Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
Amorphous (composed predominantly of noncrystalline substances precipitated or produced by chemical or biochemical action in surface or ground water or within sediments by geologic processes)	Opal	Opal > 50%; massive to banded; compact	Opal, opaline chert, porcelanite	
		Opal > 50%; porous, massive to laminated	Siliceous sinter	
		Deposited by geysers	Geyserite	
	Collophane	Accumulated bird excrement	Guano	
		Amorphous phosphates > 50%	Phosphorite	
	Limonite	Limonite > 50%	Limonite, bog iron ore	
	Amorphous hydrous aluminium oxides	Hydrous aluminium oxides > 50%, of which > 50% are amorphous	Bauxite	

			Laterite	
	Hydrocarbons	Solid	Asphalt, mineral tar, gilsonite, grahamite	
	Amorphous carbon	Fibrous to spongy to compact; carbonized plant remains < 50%; black to brown	Coal	
	Oxygenated hydrocarbons	Resinous, various light colours	Amber	
Biofragmental (composed of whole or fragmental remains of plants or animals)	Calcareous shells and fragments	Whole or fragmental shells > 50%	Coquina	
	Diatom tests	Diatom tests > 50%	Diatomite, diatomaceous earth	
	Radiolarian tests	Radiolarian tests > 50%	Radiolarite, radiolarian earth	
	Foraminifera tests	Foraminifera tests > 50%	Foraminiferal limestone	

(*Continued*)

TABLE 3 DERIVED SYMBOLS FOR SEDIMENTARY ROCK TYPES — *Contd*

Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
Biofragmental (composed of whole or fragmental remains of plants or animals)	Algal structures	Algal structures > 50%	Algal limestone	
	Coral structures	Coral structures > 50%	Coral limestone	
	Phosphatic shells teeth, bones	Phosphatic fossils > 50%	Phosphorite	
	Partially or completely carbonized plant remains	Brown to black, spongy to compact, plant remains readily visible	Peat	
		Brown to black, fibrous to compact, slakes readily	Lignite	
		Black, massive to banded, compact, slakes slowly	Bituminous coal	
		Black, massive to banded, submetallic, conchoidal fracture	Anthracite coal	

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